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The Contribution of Environmental CSR to Sustainability in the Energy Sector: A Study on PT Pema Global Energi

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ABSTRACT

This study aims to analyze the role of environmental Corporate Social Responsibility (CSR) implemented by PT Pema Global Energi in supporting environmental sustainability and community welfare in North Aceh. The research employs literature analysis, case studies, and an evaluation of empirical data from the implementation of corporate CSR programs, such as land rehabilitation, waste management, and energy efficiency. The results indicate that the company's CSR initiatives have a significant positive impact, including enhancing soil quality, conserving biodiversity, and reducing carbon emissions through the adoption of environmentally friendly technologies. Furthermore, community involvement through environmental training and programs has successfully increased local awareness and capacity for environmental stewardship. The study concludes that integrating CSR with a sustainable business model not only contributes to environmental conservation but also strengthens the company's relationship with the surrounding community. Key recommendations include enhancing public environmental education, establishing strategic partnerships, and investing in innovative technologies to broaden the impact of CSR programs.

KEYWORDS *Environmental CSR, Circular Economy, Sustainability*

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INTRODUCTION

Corporate Social Responsibility (CSR) is one of the important strategies implemented by companies to achieve sustainability from social, economic, and environmental aspects (Porter & Kramer, 2011). In the energy sector, the implementation of CSR plays a strategic role to mitigate the negative impact of industrial operations on the environment and the surrounding community. The importance of the role of CSR is increasingly emerging along with increasing global awareness of climate change issues and the need to ensure environmental sustainability (Geissdoerfer et al., 2017).

PT Pema Global Energi (PGE), as part of a regional energy company, has demonstrated a strong commitment to sustainability through good corporate governance practices and CSR initiatives that focus on environmental aspects. By managing three onshore gas fields in North Aceh, namely the Arun and South Lhoksukon Fields (SLS), PGE plays an important role in supporting the welfare of local communities while maintaining national energy security. However, energy operational activities are often accompanied by environmental challenges such as carbon emissions, industrial waste, and ecosystem degradation. Therefore, effective CSR implementation is needed to balance economic performance with responsibility towards the environment (Schaltegger et al., 2015).

CSR not only contributes to social welfare and environmental sustainability but is also able to strengthen the competitiveness of companies. Research shows that CSR integrated with internal management can improve operational efficiency, productivity, and waste management, ultimately impacting better internal quality outcomes. In addition, the active involvement of internal stakeholders, such as employees, is an important element in the successful implementation of CSR because it can improve organizational efficiency and work motivation.

Environmental management through CSR also provides opportunities to create a sustainable competitive advantage. For example, research shows that good environmental management is able to encourage innovation, increase productivity, and strengthen a company's position in the market (Montabon et al., 2007). In addition, effective CSR can increase the moral capital of the organization, which contributes positively to employee motivation and operational efficiency (Kanji & Chopra, 2010). On the other hand, energy efficiency and integrated waste management provide benefits not only from the economic aspect but also from the social sustainability aspect (Luo & Bhattacharya, 2006).

Since acquiring the management of Working Area B in 2021, PGE has realized its vision to become a leader in the provision of clean and sustainable energy. This vision is in line with the concept of the Sustainable Business Model (SBM), which emphasizes the creation of shared value for the company, the environment, and society. One of the strategic initiatives carried out is a CSR program that focuses on environmental conservation, such as land rehabilitation, waste management, and energy efficiency (Lieder & Rashid, 2016). However, the effectiveness of the program in responding to the needs of sustainability in North Aceh still requires an in-depth study based on data and analysis.

This study aims to analyze the role of environmental CSR implemented by PGE in Working Area B, especially in supporting environmental sustainability and the welfare of the local community. By integrating the SBM framework and the Circular Economy (CE) approach, it is hoped that this study can provide new insights into how energy companies can manage their social and environmental responsibilities more effectively.

This research centers on evaluating PT Pema Global Energi's Corporate Social Responsibility (CSR) strategies in supporting environmental conservation within Working Area B, assessing the impact of these environmental CSR initiatives on both environmental sustainability and community welfare in North Aceh, and exploring how sustainable business models can be adapted to enhance CSR effectiveness in the energy sector. The study aims to identify the specific environmental CSR strategies employed by the company, analyze the outcomes of these programs on local ecosystems and communities, and develop recommendations for sustainable business models that can strengthen CSR performance. Academically, the research contributes to the literature on environmental CSR implementation in Indonesia's energy sector; practically, it offers guidance for energy companies in formulating impactful and sustainable CSR strategies; from a policy standpoint, it provides recommendations to support CSR practices aligned with the Sustainable Development Goals (SDGs); and socially, it aspires to improve the quality of life for Aceh's communities through ongoing environmental stewardship.

Corporate Social Responsibility (CSR) in the energy sector has been extensively studied, with prior research highlighting its role in mitigating environmental impacts and fostering community welfare. Studies by Porter and Kramer (2011) and Geissdoerfer et al. (2017) emphasize the strategic importance of CSR in creating shared value and advancing sustainability, particularly in industries with significant ecological footprints. Similarly, Schaltegger et al. (2015) and Montabon et al. (2007) underscore how CSR initiatives can enhance operational efficiency and competitive advantage by integrating environmental management into business models. However, much of this research focuses on broad

theoretical frameworks or large-scale multinational corporations, leaving a gap in understanding how regional energy companies, especially in developing contexts, implement and adapt CSR strategies to local environmental and social challenges.

A critical research gap lies in the limited empirical analysis of CSR programs tailored to specific geographic and socio-economic contexts, such as North Aceh, Indonesia. While existing literature explores the general benefits of CSR, few studies delve into the practical challenges and effectiveness of these programs in regions facing unique environmental degradation and community development needs. For instance, the integration of Circular Economy principles into CSR, as discussed by Lieder and Rashid (2016), remains underexplored in the energy sector, particularly in how such approaches translate to tangible outcomes like land rehabilitation or waste management. This gap highlights the need for localized studies that assess both the successes and limitations of CSR initiatives in addressing pressing sustainability issues.

The novelty of this research lies in its focused examination of PT Pema Global Energi's (PGE) CSR programs, which combine environmental conservation with community welfare in North Aceh. By analyzing PGE's initiatives—such as land rehabilitation, energy efficiency, and Circular Economy-based waste management—this study provides a granular understanding of how regional energy companies operationalize sustainability. Furthermore, the research integrates the Sustainable Business Model (SBM) and Stakeholder Theory to evaluate how PGE balances economic, social, and environmental objectives, offering a holistic perspective often absent in sector-specific CSR literature. This approach not only bridges the gap between theory and practice but also identifies adaptive strategies for similar contexts.

Ultimately, this study contributes to the broader discourse on CSR by offering empirical insights into the interplay between corporate strategies, environmental sustainability, and community engagement in a localized setting. By addressing the gaps in previous research and introducing a context-specific analysis, the findings aim to inform both academic literature and practical CSR frameworks for energy companies operating in environmentally sensitive regions. The research also proposes actionable recommendations to enhance the scalability and impact of CSR programs, ensuring they align with global sustainability goals while addressing local priorities.

RESEARCH METHOD

This study utilizes a mixed-methods approach to comprehensively assess the impact of PT Pema Global Energi's (PGE) environmental Corporate Social Responsibility (CSR) programs in North Aceh. The qualitative component involves case study analysis and in-depth interviews with internal stakeholders (employees, management) and external stakeholders (*local communities*, government representatives, and NGOs) to explore perceptions and challenges related to program implementation. Purposive sampling ensures diverse representation for interviews, while stratified random sampling is used for survey distribution to capture community perspectives. Primary data is collected through structured questionnaires, semi-structured interviews, and field observations, and is supplemented by secondary data from company reports, environmental assessments, and academic literature. Research instruments are validated through expert review and pilot testing, with survey

reliability assessed using *Cronbach's alpha*. Qualitative data is transcribed and coded thematically using *NVivo*, while quantitative survey data is analyzed in *SPSS* for descriptive and inferential statistics, including regression analysis. Findings from both methods are integrated through triangulation to enhance validity, supporting a comprehensive evaluation of CSR effectiveness and providing actionable insights for sustainable CSR practices in the energy sector.

RESULT AND DISCUSSION

CSR Implementation of PT Pema Global Energi (PGE)

PT Pema Global Energi (PGE) has shown a real commitment to the implementation of social and environmental responsibility through integrated CSR programs. This commitment is reflected in various strategic initiatives that aim to have a positive impact on the environment and the surrounding community, especially in the company's operational areas. One of the main programs implemented by PGE is land rehabilitation in onshore gas operating areas such as Arun and South Lhoksukon.

This rehabilitation program is designed to restore the function of land degraded due to industrial activities. In addition, the program supports the preservation of local biodiversity that is often impacted by exploration and energy production activities. By restoring land, PGE not only improves environmental conditions, but also provides long-term benefits to the local ecosystem. This is in line with the view of Xu et al. (2021), who affirm that land rehabilitation plays an important role in maintaining ecosystem balance and improving environmental quality.

In addition to land rehabilitation, PGE has also implemented environmentally friendly technology as part of efforts to improve energy efficiency in its operations. This technology allows for the reduction of carbon emissions while increasing the effectiveness of the production process. The adoption of this kind of technology reflects a step forward in supporting sustainability.

PGE also adopts a Circular Economy approach in industrial waste management. This approach aims to reduce, reuse, and recycle the materials produced during the production process. The Circular Economy is considered an effective strategy to minimize environmental impact while improving resource use efficiency. According to Geissdoerfer et al. (2017), the application of this concept can help companies achieve a balance between economic growth and environmental conservation.

Through land rehabilitation, the application of environmentally friendly technology, and the implementation of the Circular Economy approach, PGE not only meets its environmental obligations regulated by regulations but also strengthens its position as a socially and environmentally responsible energy company. These initiatives show that PGE understands the importance of sustainability in its operations, while creating broader benefits for the community and the surrounding environment.

The Effectiveness of CSR Programs on Environmental and Social Sustainability

The effectiveness of the Corporate Social Responsibility (CSR) program run by PT Pema Global Energi (PGE) can be measured through various aspects that include environmental sustainability and social welfare. This evaluation of effectiveness shows that PGE's CSR initiatives have a significant positive impact, although they are still faced with several challenges.

Environmental Sustainability

Land rehabilitation efforts and waste management are two main pillars in PGE's CSR program that contribute to environmental sustainability. The land rehabilitation program implemented in North Aceh is one concrete example of this effort. Through tree planting and the application of soil conservation techniques, this program has succeeded in improving the quality of soil that was previously degraded due to the company's operational activities. According to Bocken et al. (2014), land rehabilitation not only improves ecological conditions but also supports the sustainability of local ecosystems by increasing biodiversity.

In addition to land rehabilitation, PGE is also active in managing industrial waste to reduce negative impacts on the environment. The carbon emission reduction initiatives implemented by PGE make a significant contribution to climate change mitigation. The use of environmentally friendly technology and the application of Circular Economy principles in waste management have enabled companies to effectively reduce their carbon footprint. Xu et al. (2021) affirm that reducing carbon emissions through CSR policies can play an important role in global efforts to address climate change.

Social Welfare

PGE's CSR program also focuses on improving social welfare through the active involvement of local communities. One of the initiatives implemented is training on environmental management for the surrounding community. The program aims to increase the capacity of communities in maintaining and preserving their own environment. This training not only provides the necessary knowledge and skills but also strengthens the community's sense of belonging to the projects carried out by the company.

Freeman (2010) in his theory of Stakeholder Theory explains that the involvement of stakeholders, including local communities, in CSR programs can increase their support and participation in company initiatives. A study conducted by Freeman (2010) shows that the involvement of the community in CSR programs increases their sense of responsibility and ownership of the projects carried out, which in turn strengthens the relationship between the company and the community.

Challenges in the Implementation of CSR Programs

Although PGE's CSR program shows positive effectiveness, its implementation is inseparable from various challenges. One of the main challenges is the limited resources available to carry out CSR programs optimally. These limitations can hinder a company's ability to expand the reach of CSR initiatives and achieve a broader impact.

In addition, resistance from people who do not understand the importance of environmental conservation is also an obstacle in the implementation of CSR programs. Negative perceptions or lack of understanding of the benefits of CSR programs can reduce the active participation of the community in initiatives run by companies. Therefore, a more adaptive CSR strategy tailored to local needs is needed to increase participation and ensure more effective long-term impact (Perera & Nadeau, 2022).

Recommendations to Improve the Effectiveness of CSR Programs

To address these challenges and increase the effectiveness of CSR programs, PGE needs to develop strategies that are more inclusive and responsive to the needs of local communities. A more participatory approach, where the community is directly involved in the planning and implementation of CSR programs, can increase their sense of ownership and support for the company's initiatives. In addition, increased resource allocation for CSR programs will allow companies to better execute initiatives and achieve more significant impact.

In addition, more intensive education and socialization about the importance of environmental conservation and the benefits of CSR programs for communities can help reduce resistance and increase understanding and support from local communities. Thus, CSR strategies that are tailored to local needs and conditions will be more effective in achieving environmental sustainability and social welfare goals.

Overall, PGE's CSR program shows positive effectiveness in supporting environmental sustainability and improving social welfare. However, to achieve greater and sustainable impact, companies need to continuously adapt and improve their CSR strategies in accordance with the evolving dynamics and needs in their operational environment.

Integration of CSR Theory in PGE Practice

The implementation of *the Corporate Social Responsibility* (CSR) program carried out by PT Pema Global Energi (PGE) can be analyzed using two significant theoretical approaches, namely *Triple Bottom Line* (TBL) by Elkington (1998) and *Stakeholder Theory* by Freeman (2010). These two theories provide a solid analytical foundation for evaluating how PGE's CSR creates sustainable impacts on the environment, society, and the company.

Triple Bottom Line Integration in PGE's CSR Program

The Triple Bottom Line Theory by Elkington (1998) emphasizes the importance of a balance between the three main dimensions of sustainability: economic, social, and environmental. For PGE's CSR, this approach is reflected through various initiatives such as land rehabilitation programs and energy efficiency.

Land rehabilitation programs, particularly in onshore gas operating areas such as Arun and South Lhoksukon, aim to restore ecosystems degraded by industrial activities. By involving soil conservation techniques and planting local vegetation, PGE not only supports environmental sustainability, but also increases the economic potential of the region through improved land productivity.

In addition, energy efficiency carried out through the adoption of green technologies helps companies reduce carbon emissions while lowering operating costs. This step reflects

how PGE manages to create economic value without sacrificing its social and environmental responsibilities, in line with the principles outlined in the Triple Bottom Line theory.

Implementation of Stakeholder Theory in PGE's CSR Practice

The Stakeholder Theory approach by Freeman (2010) highlights the importance of the involvement of all stakeholders to ensure the sustainability of the company. In the implementation of CSR, PGE actively engages local communities, governments, and other partners through programs designed to provide direct benefits to the community.

One example of the implementation of this theory is environmental management training provided to the community around the operational area. The program not only raises public awareness of the importance of environmental conservation but also creates a more harmonious relationship between companies and local communities. Freeman (2010) emphasized that stakeholder involvement not only supports the company's operational success but also strengthens the company's legitimacy in the eyes of the public.

Theoretical Synergy in the Implementation of PGE CSR

The integration between *the Triple Bottom Line* and *Stakeholder Theory* reflects how PGE has successfully adopted a holistic approach in CSR implementation. By balancing economic, social, and environmental dimensions while engaging stakeholders, PGE has created a sustainable positive impact.

The success of this CSR program shows that these theories can be an effective foundation to direct the company's strategy in achieving long-term sustainability. However, to expand its CSR impact, PGE needs to continue to improve collaboration with stakeholders, adopt more innovative technologies, and integrate local needs in future CSR program planning.

Through its planned implementation and based on these theories, PGE has demonstrated a real commitment to environmental preservation and community welfare, while ensuring the sustainability of the company's operations.

Implementation Challenges and Completion Strategies

The implementation of *the Corporate Social Responsibility* (CSR) program at PT Pema Global Energi (PGE) faces several challenges that can affect the effectiveness and continuity of the program. These challenges involve limited resources, resistance from the community, and obstacles in the application of environmentally friendly technologies. However, with the right strategy, these challenges can be overcome to achieve more optimal results.

Resource Limitations

One of the main challenges faced by PGE is the limited budget and resources to carry out CSR programs in a sustainable manner throughout its operational areas. These limitations hinder the company's ability to develop broader CSR initiatives and reach all communities affected by the company's operations. Larger programs, such as land rehabilitation and carbon emission management, require significant investments, while limited budgets often limit the scope and impact of these initiatives.

Community Resistance

In addition to limited resources, resistance from local communities is also an important obstacle in the implementation of CSR. The public's lack of understanding of the long-term benefits of CSR programs often hinders their active participation in various initiatives undertaken by companies. This can lead to disharmony between the company and society and reduce the effectiveness of the CSR programs carried out. Without community participation, CSR programs will not run optimally, and the desired sustainability goals will be difficult to achieve.

Technology Constraints

Another obstacle is the high cost of adopting environmentally friendly technologies needed to improve energy efficiency and reduce environmental impact. The use of greener technologies, such as Circular Economy-based technologies, requires large initial investments. The cost of implementing this technology is challenging, especially for companies with limited budgets. While such technologies can bring long-term benefits in terms of reduced operational costs and environmental impact, difficulties in financing are a major barrier to the expansion of green technologies in companies.

Recommended Completion Strategies

To overcome these challenges, the following strategies can be implemented:

Strategic Partnerships

PGE can develop partnerships with governments and donor agencies that have greater resources to support the funding of CSR programs. With this partnership, the company can obtain financial and technical support that allows the expansion of CSR initiatives without burdening the company's internal budget. These partnerships can also strengthen the legitimacy of CSR programs in the eyes of the public and increase collaboration between various stakeholders.

Community Education

To overcome community resistance, PGE needs to hold an educational campaign that aims to increase public awareness and understanding of the importance of environmental conservation and the positive impact of CSR programs on them. Through intense training and socialization programs, the public can better appreciate the long-term benefits of CSR activities, so they are more willing to actively participate in these programs.

Technology Investment

Given the cost constraints in adopting environmentally friendly technologies, PGE needs to allocate resources to invest in Circular Economy-based technologies. This approach can help reduce operational costs in the long run by minimizing waste and improving resource use efficiency. Additionally, investments in more efficient technologies can be an attraction for external stakeholders, including customers and regulators, who increasingly demand companies to operate in a more sustainable way.

By implementing these strategies, PGE can overcome the challenges faced in the implementation of CSR and strengthen the positive impact generated by its programs. Success in overcoming these challenges will enable PGE to continue to contribute to environmental and social sustainability, while supporting the growth of a more responsible company.

Sustainability Impact Analysis and Prospects

The results of the analysis show that the implementation of the Environmental Corporate Social Responsibility (CSR) program carried out by PT Pema Global Energi (PGE) has had a significant positive impact, both in terms of environmental conservation and improving the welfare of local communities. Programs such as land rehabilitation and carbon emission management implemented by the company have succeeded in reducing the negative impact of the company's operations on the surrounding ecosystem, especially in the North Aceh and Aceh Besar regions. Tree planting and the use of soil conservation techniques in land rehabilitation programs help improve soil quality and restore ecosystem functions that had been disrupted by industrial activities.

In addition, carbon emission reduction initiatives implemented by PGE also contribute to climate change mitigation. The program not only provides direct benefits to the environment but also creates awareness of the importance of sustainability among local communities and other stakeholders, such as governments and customers. The active involvement of communities in various CSR programs also increases their capacity in maintaining and preserving the surrounding environment, which in turn improves their quality of life.

However, even though the positive impact has been seen, the success of this CSR program still requires greater support from all relevant parties. Stakeholders, including governments, local communities, and strategic partners, need to work together more intensively to create broader and more sustainable impacts. In this regard, it is important to ensure that government policies and regulations support the company's efforts in implementing CSR programs based on environmental sustainability. In addition, education and public awareness raising are key to strengthening their participation in these programs.

Going forward, the prospects for CSR sustainability in the energy sector, especially for PGE, depend on a holistic and adaptive approach that can adapt to changing needs and challenges. Through strategic partnerships with various parties, such as governments, donor agencies, and the community, PGE can increase the scale and impact of its CSR initiatives. In addition, investing in environmentally friendly technology and the application of *Circular Economy* principles can be an important step to reduce operational costs and magnify the environmental benefits generated.

By involving various stakeholders in every stage of planning and implementation, as well as continuously adapting to existing developments, PGE's CSR programs can provide long-term benefits that are not only for the company, but also for society and the environment as a whole. Therefore, the implementation of sustainable CSR must continue to be a priority in PGE's business strategy to realize broader and more sustainable sustainability.

CONCLUSION

The analysis concludes that PT Pema Global Energi (PGE) has implemented an integrated environmental CSR strategy—encompassing land rehabilitation, Circular Economy-based waste management, and carbon emission reduction through environmentally friendly technology—which demonstrates the company's commitment to ecosystem sustainability in North Aceh. These initiatives have positively impacted both environmental sustainability and local community well-being, as evidenced by restored soil quality, improved biodiversity, and increased community awareness through environmental management training. While PGE's sustainable business model has enhanced CSR program effectiveness, further improvements are possible through greater technological innovation, strategic partnerships, and deeper community engagement. It is recommended that PGE intensify education and outreach on environmental conservation, strengthen collaborations with government and relevant institutions, invest in innovative technologies, regularly evaluate program effectiveness, and expand land rehabilitation efforts. For future research, a longitudinal study examining the long-term socio-environmental impacts of integrated CSR strategies across multiple regions would provide valuable insights for advancing sustainability in the energy sector.

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